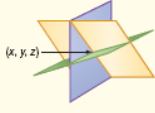
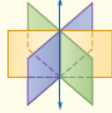



### 3-5 Solving Systems of Equations in 3 Variables

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Key Concept	System of Equations in Three Variables
<b>One Solution</b> <ul style="list-style-type: none"> <li>planes intersect in one point</li> </ul> 	<b>Infinite Solutions</b> <ul style="list-style-type: none"> <li>planes intersect in a line</li> <li>planes intersect in the same plane</li> </ul> 
<b>No Solution</b> <ul style="list-style-type: none"> <li>planes have no point in common</li> </ul> 	

Consistent (at least one solution)

- ordered triple
- line
- plane

True statement

$\infty$  # of solutions (could be a plane or line)

False statement

no solution

Inconsistent (no solution)

ex 1

- (1)  $2x - y - z = 1$
- (2)  $x + 2y + z = 0$
- (3)  $3x - y - 2z = -1$

Eliminate  $z$

$$\begin{array}{rcl} (1) + (2) & = & 3x - y - z = 1 \\ (2) \times 2 & & 2x + 4y + 2z = 0 \\ \hline 3x + y & = & 1 \\ 5x + 3y & = & -1 \\ \hline -9x - 3y & = & -3 \\ \hline -4x & = & -4 \end{array}$$

$x = 1$

$3(1) + y = 1$   
 $y = -2$   
 $z = 3$

$(1, -2, 3)$

ex 2

- (1)  $2x + y - 2z = -2$   $\times 3$
- (2)  $-x - 3y - 2z = 5$
- (3)  $-4x - 2y + 3z = 2$   $\times 2$

$$\begin{array}{rcl} 2x + y - 2z & = & -2 \\ x + 3y + 2z & = & -5 \\ \hline 3x + 4y & = & -7 \\ -8x - 4y & = & -8 \\ \hline -5x & = & -15 \end{array} \quad \begin{array}{rcl} 6x + 3y - 6z & = & -6 \\ -8x - 4y + 6z & = & 4 \\ \hline -2x - y & = & -2 \\ -2(3) - y & = & -2 \\ y & = & -4 \end{array}$$

$x = 3$

ex 3:

$$\begin{cases} x - 3y + 4z = 10 \\ 2x - y - z = 7 \\ x - 4y = 1 \end{cases}$$

$$9x - 7y = 38$$

$(5, 1, 2)$

Do:

$$\begin{aligned} 2x + y + z &= 0 \\ x - 2y + z &= 2 \\ 3x - y + 2z &= 2 \end{aligned}$$

HW

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12, 16, 17, 19, 20